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TREATMENT FOR EPILEPSY IN ONE EASTERN BLACK RHINO (*DICEROS BICORNIS MICHAELI*) AT POTTER PARK ZOO

Pat Fountain, Potter Park Zoo, pfountain@ingham.org

The purpose of this presentation is to share the experiences we as a staff at the Potter Park Zoo went through in the discovery, diagnosis, and treatment of epilepsy in Jello, an 8-year-old male Eastern Black Rhino. From the time of his arrival in June 2011, to the time of his death in 2015, the staff at Potter Park Zoo spent countless hours providing Jello the very best care to help manage his condition. After discovering some odd behavior, which we soon confirmed were pre-seizure activities, on the morning of June 4th, 2012, Jello quickly progressed into full on seizures that occurred hourly for approximately 9 hours that day. Potter Park Zoo staff did their best to help him through these seizures as well as trying to document a few episodes to share and seek guidance for what he was going through. The vet and keeper staff then created a management plan for medication and husbandry to treat this condition. For keeper staff, the daily preparation of meds, including creating numerous methods of hiding and administering meds, could take up to four hours for the three time a day medication routine. With much trial and error, multiple medications, many different dosages, and consistent blood testing to measure the medicinal concentration, we found a regimen that allowed Jello to live a full and complete life until the day he passed. There were good days and bad days but we learned from each one and moved forward to create a positive, safe environment for him to live. With much research in the years since first dealing with this illness and talking to many rhino experts worldwide, we have found that seizures in rhinos and specifically long-term management of seizures are a rare occurrence and are something that should be shared in the rhino keeper community.

EFFECTS OF SWARD STRUCTURE ON THE GRAZING BEHAVIOUR OF CAPTIVE SOUTHERN WHITE RHINOCEROS (*CERATOTHERIUM SIMUM SIMUM*)

Leah Drury, Knowsley Safari, l.drury@knowsley.com

Zoological collections strive to provide natural diets which can be difficult to achieve in grazing African megafauna such as White rhinoceros (*Ceratotherium simum simum*) for whom grazing must be replicated to meet both nutritional and behavioural requirements. As sward (grass) length increases throughout the year it naturally becomes denser, allowing species that graze longer sward to take advantage of greater instantaneous intake rates. However, as sward density increases, so does concentration of cell wall components, making the grass tougher to process and reducing diet quality. It has been suggested that sward length and the digestive constraints it can offer should have less effect on hindgut fermenters in comparison to ruminants. Ruminant grazing strategies are thought to be governed by slow digestion rate due to the time needed for rumination. This results in ruminants often being found to favour shorter, higher quality sward. Additionally, ruminant dentition does not favour the handling of the tougher stems of longer sward. In this respect, hindgut fermenters with double sets of incisors, such as equids, may have an advantage. However, not all hindgut fermenters share this dentition - White rhinoceros only have molars and pre-molars. To examine the effects of sward structure on the grazing behaviour of captive White rhinoceros, a preliminary investigation was undertaken at Knowsley Safari. The selection rate of short, medium and long length sward and maintenance of grazing lawns over a 20.5-hectare reserve indicated that incidence of white rhino grazing on short sward was significantly higher than incidence of white rhino grazing on medium or long length sward ($Z= 8.83$, $p= <0.03$). These results suggest that the subjects benefitted from the higher nutritional quality of the short sward rather than the higher instantaneous intake rate offered by

the longer swards. Further research should be undertaken to determine the comparative nutrition of White rhinoceros grazing intake *in situ*, and whether differences in dentition across the order *Perrisodactyla* has a role to play in sward length preference.

TRAINING A WHITE RHINO FOR ARTIFICIAL INSEMINATION

Amber Berndt and Susanne Wyatt, Indianapolis Zoo, aberndt@indyzoo.com, swyatt@indyzoo.com

Indianapolis Zoo has a female southern white rhinoceros (*Ceratotherium simum simum*) from Kruger National Park who isn't cycling on her own. We have partnered with Cincinnati Zoo's Conservation and Research of Endangered Wildlife (CREW) and began hormone therapy to assist with successful cycling. Progesterone has been monitored via blood and urine throughout hormone treatment in order to establish baseline hormone levels for her cycles. Transrectal ultrasounds show successful follicular development, however, our proven bull has not bred her. Training and desensitization occurred in preparation of a hymen rupture and multiple artificial insemination procedures. Attempted artificial insemination continues with this female. Due to our success with this female, we decided to attempt hormone therapy and artificial insemination on our older female who has had nine calves. However, her last calf was a stillbirth and her cycles have since been erratic and the proven bull will only breed her in the warmer months although she's cycling regularly.

THE RHINO RESCUE CENTER: SAVING THE NORTHERN WHITE RHINO

Jill Van Kempen, San Diego Zoo Safari Park, jhampson@sandiegozoo.org

San Diego Zoo Global is committed to saving species from the brink of extinction. No species better fits this description than the northern white rhinoceros. With only three individuals left on the planet, human intervention is needed. Through the international collaboration of scientists and animal care professionals, it was decided that there was enough diverse genetic material banked from the northern white rhino to attempt assisted reproduction techniques. The Rhino Rescue Center was built as a first step. This research facility is home to six, wild-born, southern white rhino females that were imported from Africa in 2015. The center was uniquely constructed with their specific needs, and the needs of our Reproductive Sciences team, in mind. The rhino's training program allows for voluntary participation in their daily care and medical procedures. One of the most important voluntary behaviors is for the rhinos to allow weekly transrectal ultrasounds to be performed. In being able to frequently and reliably view the reproductive anatomy of each female, their cycles can be tracked and invaluable data is gathered. In the short time since the rhinos have arrived from Africa, they have made extensive progress behaviorally and continue to hit their training goals. As an added focus, The Rhino Rescue Center is committed to the highest level of animal welfare, which includes detailed records, scoring systems, specialized diets and an engaging enrichment program. The end goal is for these six females to become surrogate mothers to northern white rhino calves. Geneticists and reproductive physiologists are working to perfect techniques to create viable reproductive cells and eventually perform successful embryo transfer. There are many steps to be taken between now and then but we hope to one day reach our goal of saving the northern white rhinoceros from extinction.

RHINO CONSERVATION: ENFORCEMENT TO EDUCATION

Sarah Metzer, USFWS, Office of Law Enforcement, National Eagle and Wildlife Property Repository, sarah_metzer@fws.gov

The recent spike in rhino poaching and rhino horn trafficking necessitates action to save this iconic species from extinction. U.S. Fish and Wildlife Service's Office of Law Enforcement works on both ends of the spectrum to protect rhinos, effectively enforcing Federal laws and reducing demand through education and awareness campaigns such as Operation Crash and the San Diego Zoo rhino horn burn. Learn what updates are taking place and how zoo professionals can be involved.

A preliminary investigation into the effects of sward structure on the grazing behaviour of captive White rhinoceros (*Ceratotherium simum simum*) at Knowsley Safari

Leah Drury & Bridget Murray

KNOWSLEY SAFARI

Acknowledgments

Overview

Today I am going to ask more questions than I answer!

- Nutrition
  - Sward Structure
  - Introducing the Grazing Lawn
- Hypothesis
- Our facility
- Method
- Seasonal results
- Findings
- Questions

KNOWSLEY SAFARI

Zoological collections strive to recreate natural environments…

KNOWSLEY SAFARI

Nutrition

Nutrition in captivity can have a large impact on health, longevity and reproductive ability in captive ungulates (Forthman, 1998)

KNOWSLEY SAFARI

Nutrition

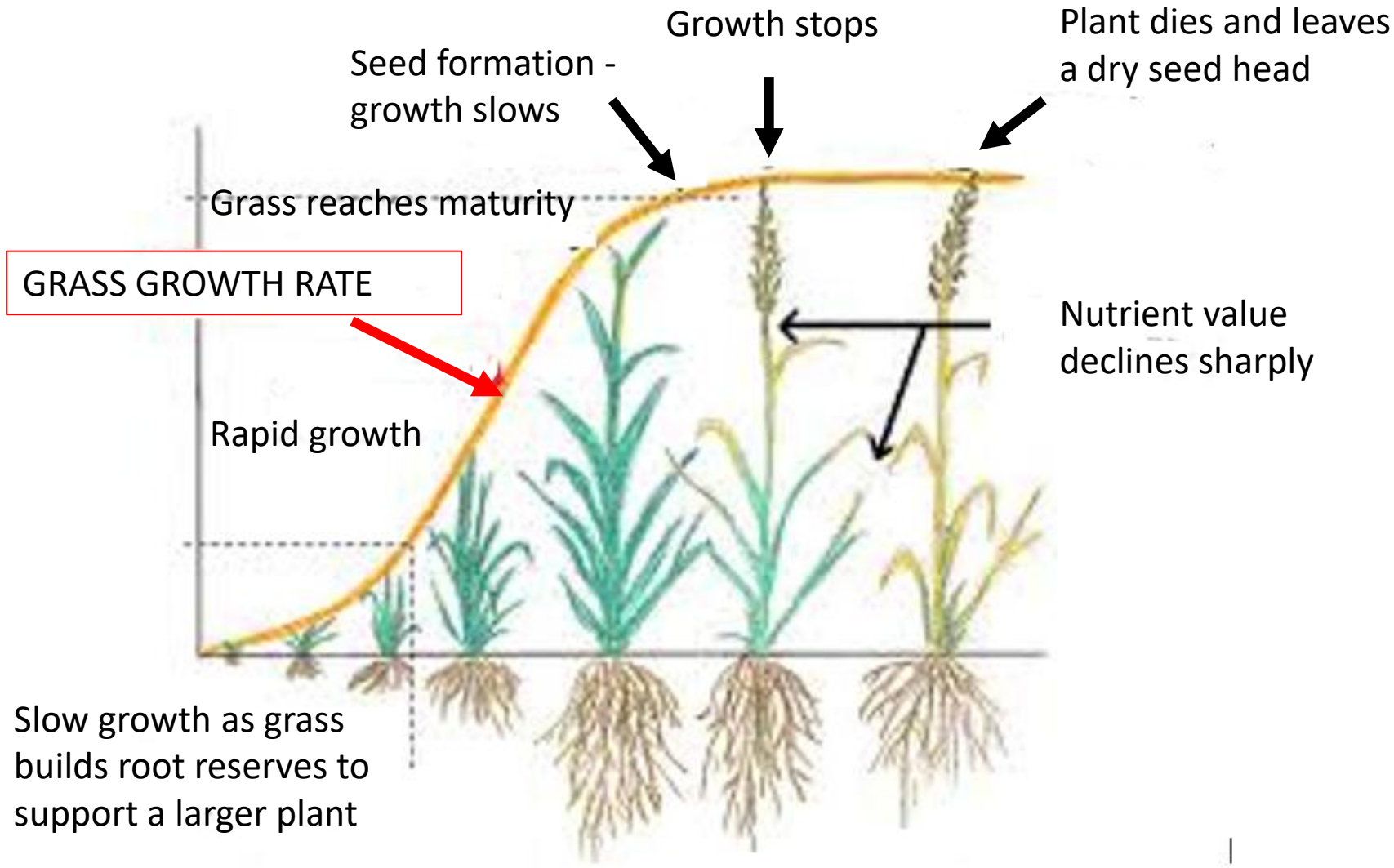
Ideally the captive diet needs to best mimic the high quantity, low nutrition forage encountered in the wild.

Zootrition recommends minimal nutritional requirements for captive White rhinoceros be formulated using equine recommendations:

- avoid over conditioning hays
- use low-glycemic index concentrates

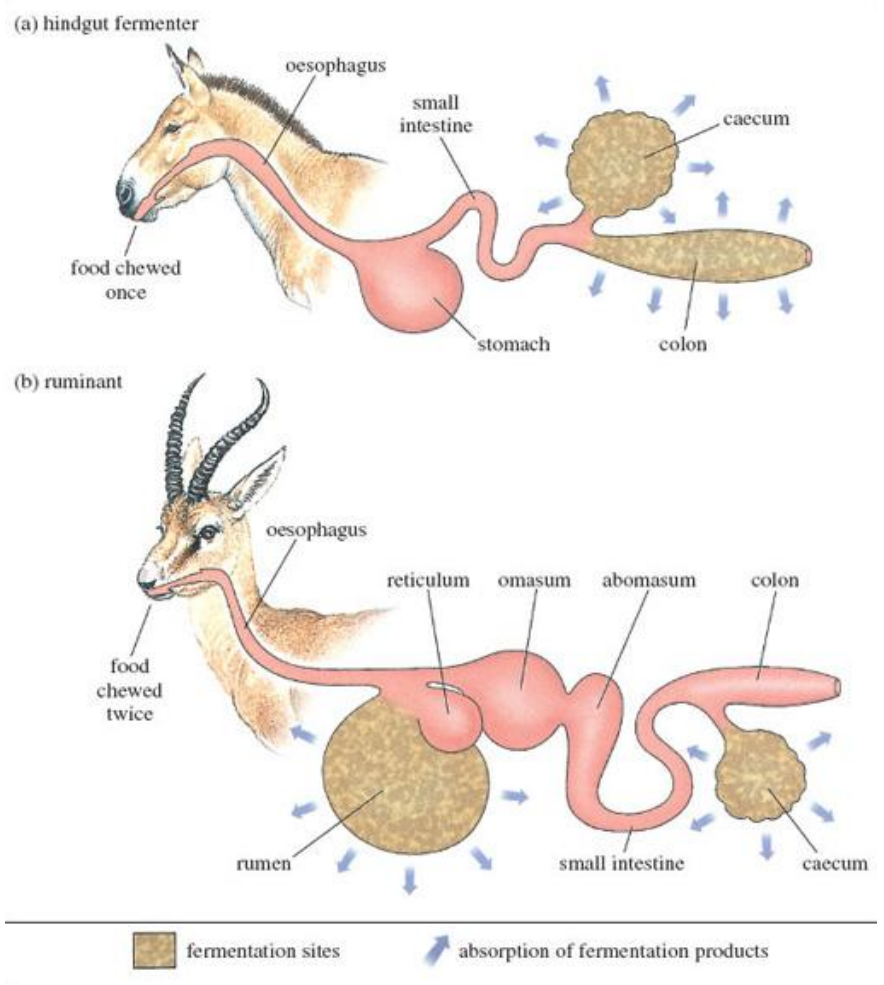
KNOWSLEY SAFARI

Nutrition: Sward structure



Nutrition: Introducing the Grazing lawn

- Captive white rhino nutrition is often formulated using equine recommendations.
- Equids, hindgut fermenters (and potentially other members of Perissodactyla), have a large intake of roughage, greater than that of ruminants
- This leads to the maintenance of open areas of pasture and control of competitive grasses (Fleurance et al, 2012)



http://www.open.edu/openlearn/nature-environment/natural-history/studying-mammals-plant-predators/content-secti

KNOWSLEY SAFARI

Nutrition: Introducing the Grazing lawn

Credit: picarena.com

- Need a high volume of poor quality forage to pass through a hindgut fermenter
- Hindgut fermenters less constrained than ruminants in shorter swards due to their double set of incisors (Fleurance, 2010)

KNOWSLEY SAFARI

Credit: Houston zoo.org

Nutrition: Introducing the Grazing Lawn

However, does this also apply to the Southern white rhinoceros as in contrast to other Perissodactyla it does not have a double set of incisors but only pre-molars and molars?

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Nutrition: Introducing the Grazing lawn

- Inspired by the work by Cromsigt and Te Beest (2014)
  - 30 year review of grassland heterogeneity data in Kruger National park in relation to the effect of reintroducing white rhinoceros.
  - Found that short grass cover was higher in high rhino impact (17.5%) than low rhino impact landscape (10.7%).
  - Twenty times more grazing lawns were identified on high rhino impact landscapes than low rhino impact landscapes.

KNOWSLEY SAFARI

Credit: https://www.allaboutstem.co.uk/2017/06/adventure-calls-at-knowsley-safari/

Hypothesis:

Captive Southern white rhinoceros choose to graze on shorter length sward and maintain grazing lawns as seen in the wild.

KNOWSLEY SAFARI

Facility

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- 1.6 White rhinoceros
- 6.27 Common eland
- 2.5 Dwarf forest buffalo
- 2.2 Common waterbuck
- 86 Kafue flats lechwe
- 1.4 Ostrich
- 0.4 Grant’s zebra
- 1.3 Brindled wildebeest
- 1.2 Roan antelope
- 1.5 Guinnea fowl

All with 24 hour access to the reserve for duration of the study

Method:

Sward length

- Measured at eight randomly assigned sights every two weeks during the UK grass growing season (May-October)
- Using a 30cm metal ruler to the top of the stem leaf and NOT the flower head

Grazing location

- An eight figured OS grid reference for each specimen was recorded at the beginning, middle and end of the working day (8am-6pm)

KNOWSLEY SAFARI

Sward length map

An estimate of the area of short, medium and long sward length on the reserve was sketched and later overlaid onto google maps satellite images of the reserve aided by GPS reference taken while noting the sketches.

- Short sward: < 10cm long
- Medium sward: 10-18cm
- Long sward: 20cm +

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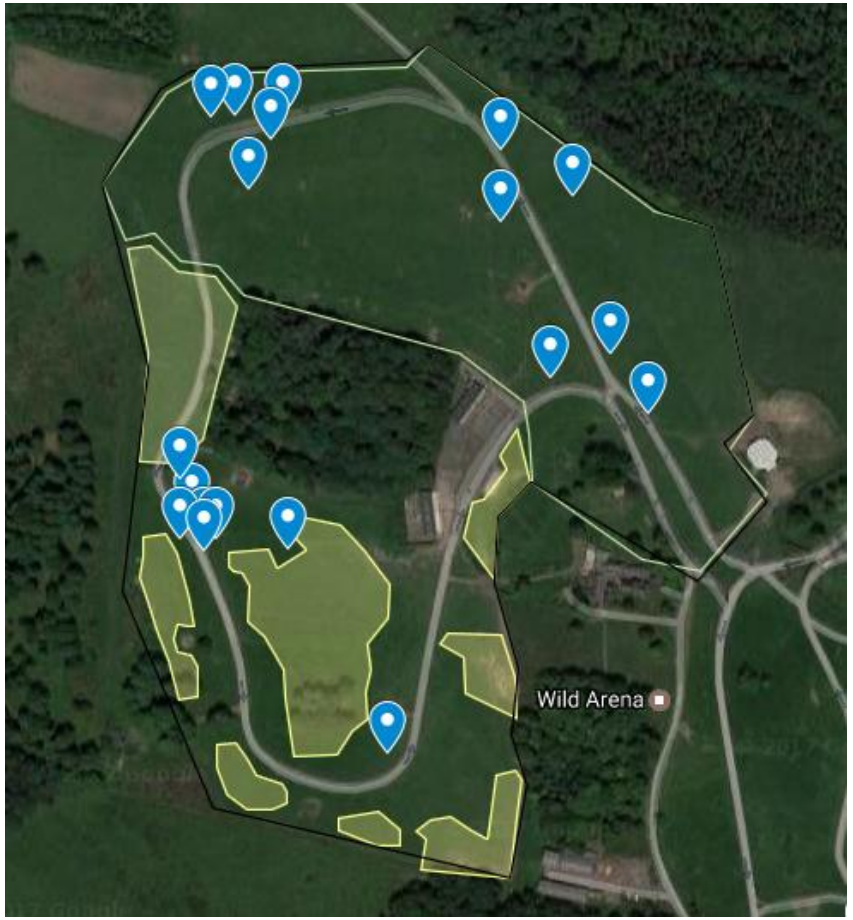
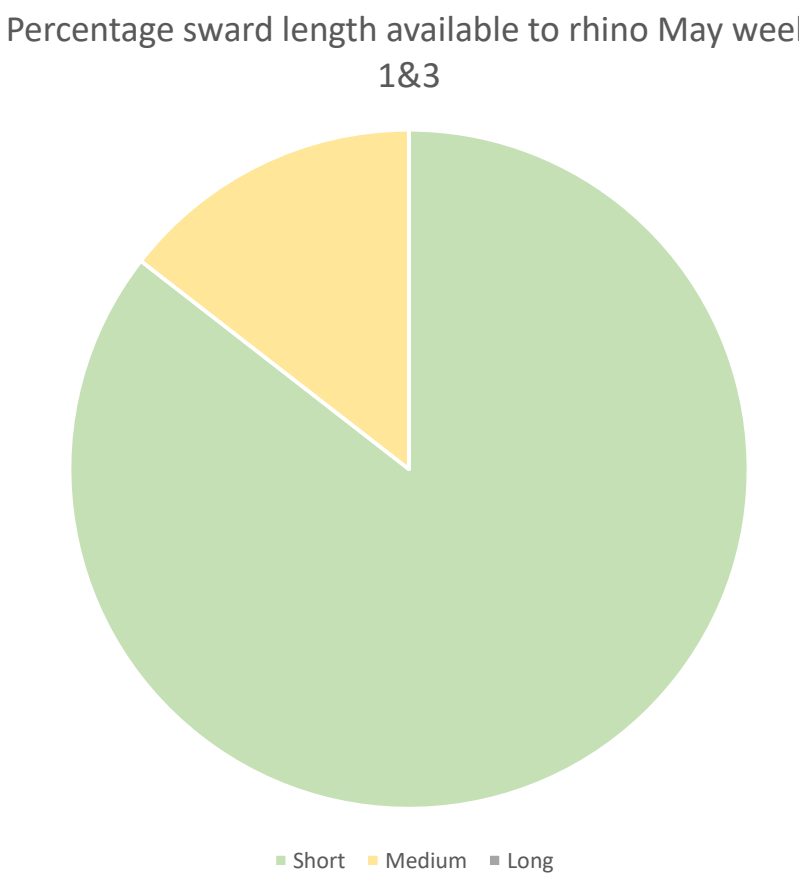
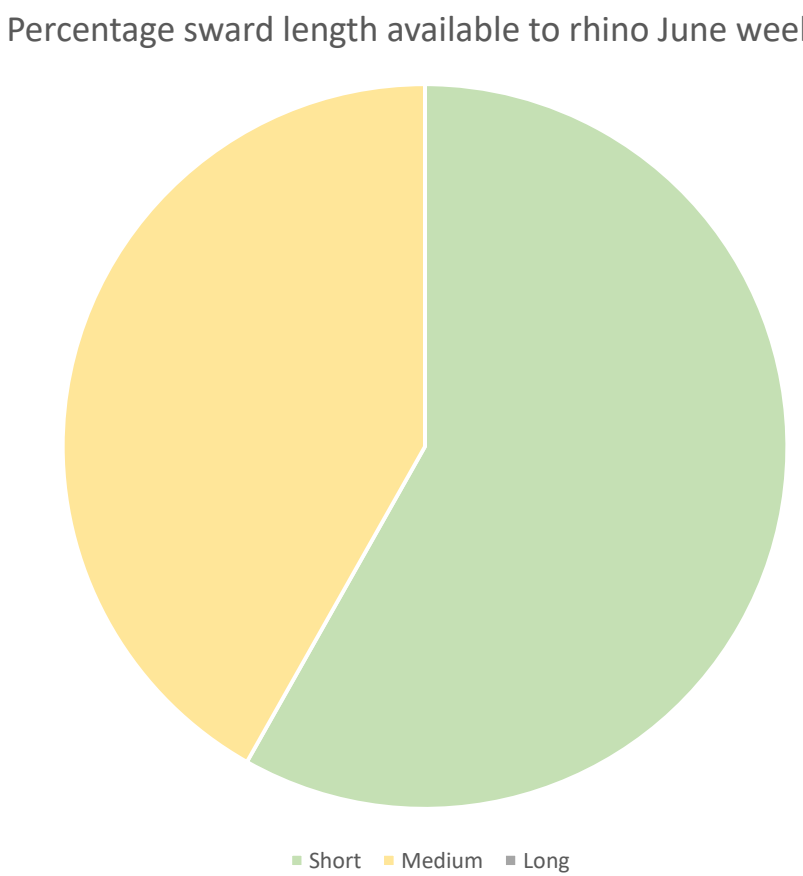
Results: May Week 1 &3

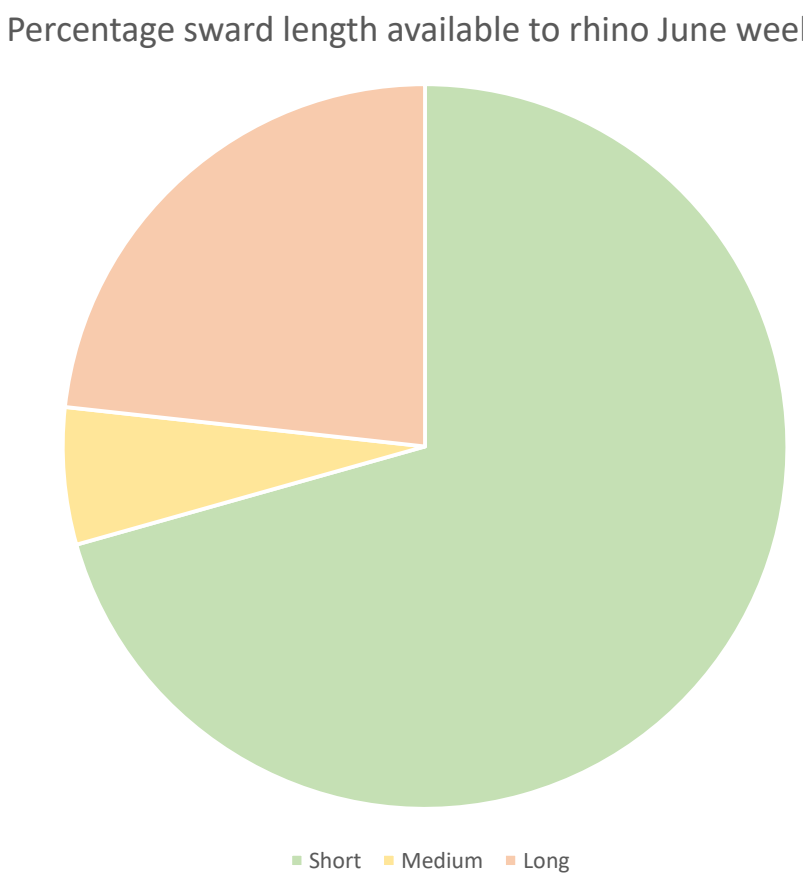




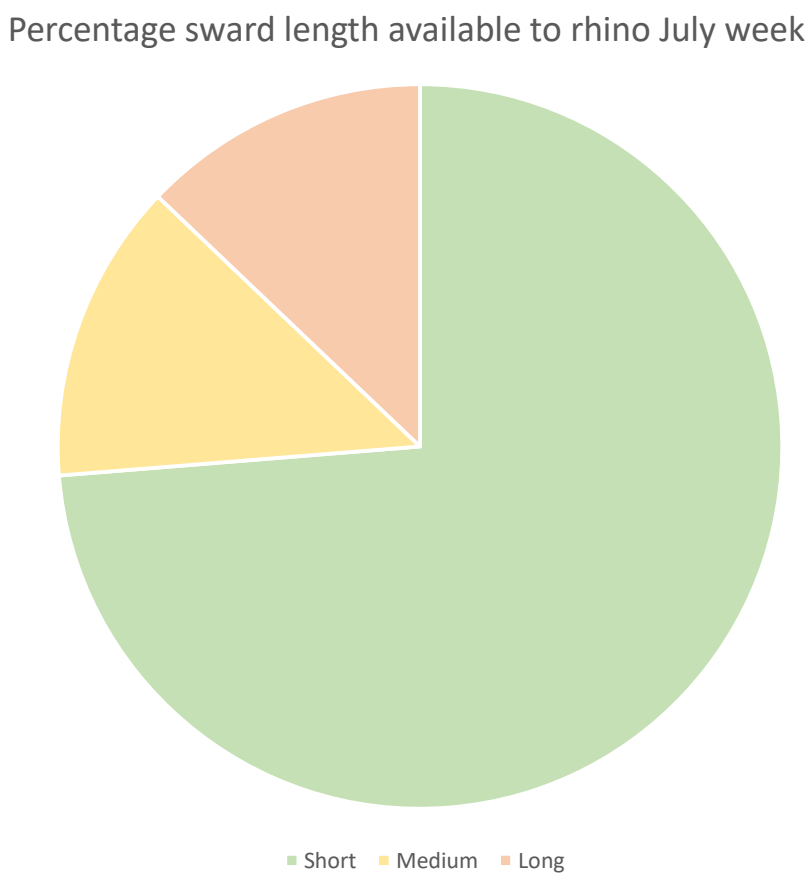
Results: June Week 1



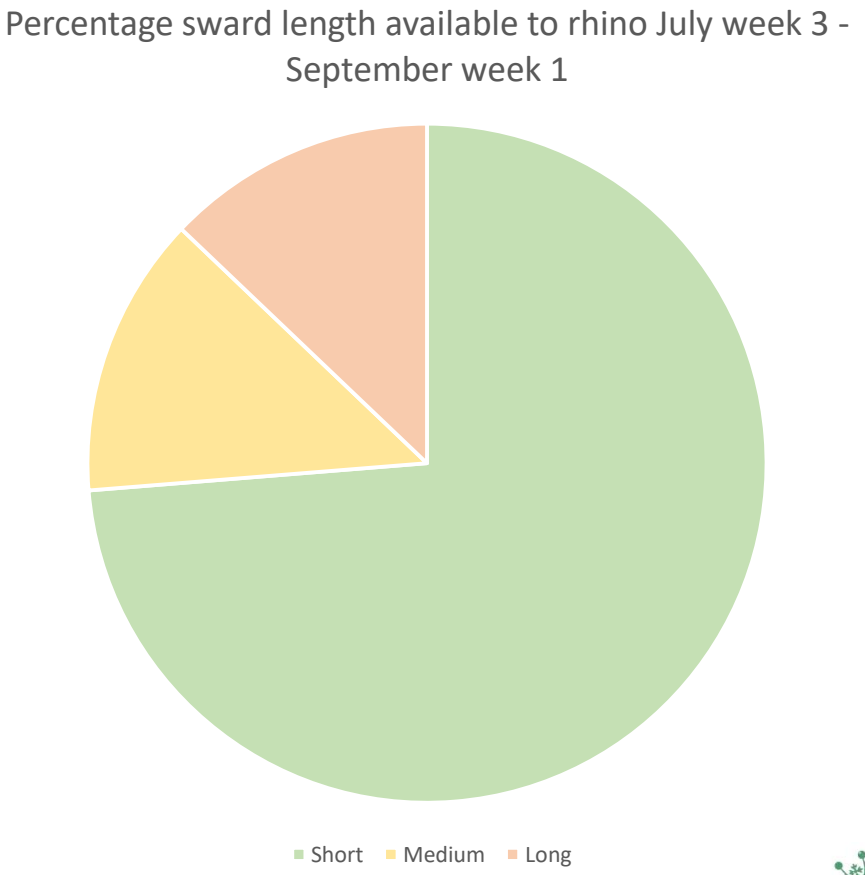
Results: June Week 3



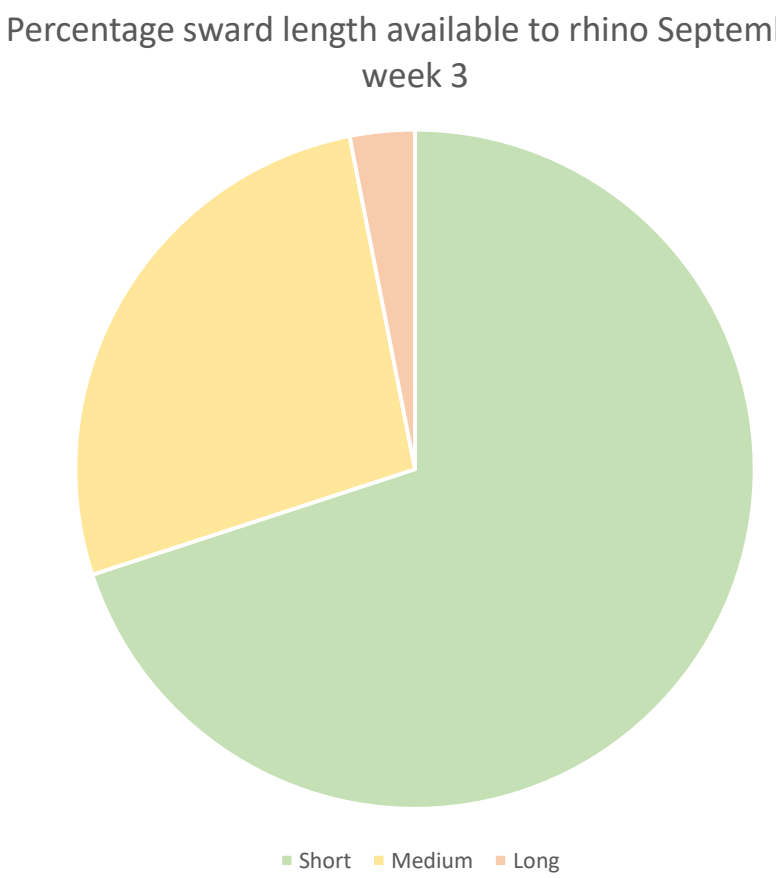
Results: July Week 1



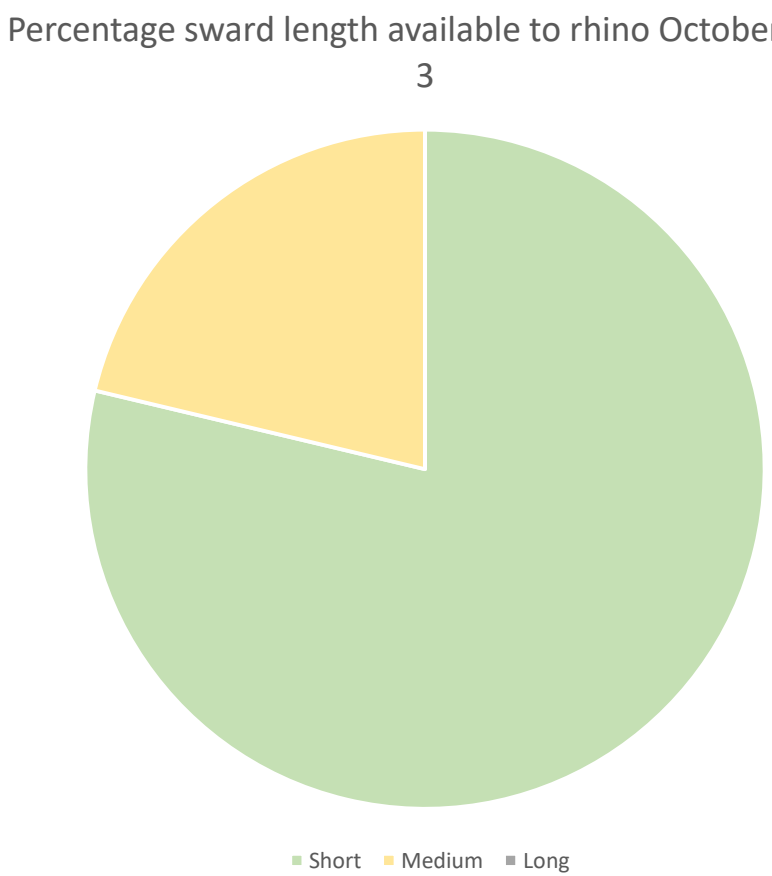
Results: July Week 3 – September Week 1



Results: September Week 3



Results: October Week 1 - 3



Results:

A Wilcoxan Signed-Ranks Test indicated that incidence of rhino choosing to graze on short sward was statistically significantly higher than incidence of rhino choosing to graze on medium or long length sward ($Z = 8.83$, $p = <0.03$)

KNOWSLEY SAFARI

Discussion

Despite the results being statistically significant…

- Grazing preferences of other species
- Weather
- Soil quality
- Drainage
- Shading and fencing

…have **not** been taken into account

KNOWSLEY SAFARI

Discussion

...neither have the borders of the medium and high sward length patches been accurately mapped.

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Discussion

Buffalo favour to rest in the long grass on hot days

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Discussion

Eland and lechwe calves hide in the long grass

Discussion

Wear and tear have not been accounted for

Could we hypothesise a minimal grazing requirement for captive white rhino?

Total area: 20.5 hectares (50.7 acres)

Total area sward greater than 10cm: 8.574 hectares (21.2 acres)

Total area short sward maintained: 11.476 hectares (28.4 acres)

(Grazing lawn)

….6 adult rhino on reserve (plus one 6 month old calf which has not been counted as not fully weaned).

Hypothetical grazing lawn maintained per adult rhino: <u>1.913 hectares (4.7 acres)</u>

KNOWSLEY SAFARI

But at this point?

No – need more data!

Conclusion

Providing ad libitum grazing opportunity to unselective grazers such as the white rhinoceros in captivity could help steer away from dietary imbalance.

Unfortunately, the provision of ad libitum grazing opportunity in captivity is often confounded by the constraint of paddock size.

For a comprehensive study on Knowsley Safari's reserves grazing potential to be done it could be wrong to focus on nutritional value alone due to the multifaceted influences of behaviour and husbandry as well.

KNOWSLEY SAFARI

Any questions?

research@knowsley.com

KNOWSLEY SAFARI

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KNOWSLEY SAFARI